POPULATION TRENDS of Oklahoma Towns and Cities

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Technical Bulletin T-105
December, 1963

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Summary

This study was made to determine the relative influence of eight variables upon the population growth and decline of Oklahoma population centers from 1930-40, 1940-50, and 1950-60. Its objective was achieved by using the least squares method of solving simultaneous equations.

Briefly, the findings of the study are as follows: First, that size of place, county governmental status, censal decade, state economic area, and highway routes explain significant proportions of the variations in the total population shifts of Oklahoma towns and cities.

The size of place at the beginning of the decade outweighs all other variables in importance in accounting for absolute population changes. This variable alone accounts for about 60 percent of the variations in the total population changes of Oklahoma centers during the three decades after adjusting for the effects of all other independent variables and for over 70 percent of the 1950-60 variations after adjustment.

The influence of county seats and highways upon white population gains disappears when first adjusting the population centers for the effects of the other independent variables.

The influence of state economic areas upon nonwhite population gains vanishes when first adjusting for the effects of the other independent variables.

One significant interaction (county governmental status-state economic area) tends to conceal the precise association of each of the two separate variables with demographic trends of Oklahoma towns and cities.

F-tests signify that for Y_1, changes in the number of residents of the total population of Oklahoma population centers, the following six hypotheses must be rejected: 1, 2, 3, 4, 7, and 9; for Y_2, the white population changes of the Oklahoma towns and cities, F-tests signify the rejection of the following five hypotheses: 1, 2, 3, 4, and 9; for Y_3, the nonwhite population changes of the Oklahoma centers, F-tests signify the rejection of the following five hypotheses: 1, 2, 3, 7, and 9.

The magnitude of the unexplained sums of squares of population changes of Oklahoma population centers in the past three censal decades implies that population trends of towns and cities are also functions of other independent variables. Evidence accumulated in this study, covering as it does only a short span of thirty years, indicates that the variables regulating the growth and decline of population centers vary with time.

Population Trends of Oklahoma Towns and Cities

James D. Tarver and Joseph C. Urbon*

Research reported herein was made to determine demographic changes of all separately enumerated population centers in Oklahoma during the three most recent decades: 1930-40, 1940-50, and 1950-60. Demographic changes were determined between the white and nonwhite populations. The concurrent population shifts and movements and the underlying patterns which they took were also determined.

Factors Influencing Population Change

Fluctuations in the number of inhabitants of any "place" are due to the effects of three demographic processes: births, deaths, and migration. Since mobility plays such a prominent role in population trends, many studies have employed variables which reflect only the geographic movement of individuals. Others have chosen variables which purportedly show the over-all net influence of the three basic factors on population growth and decline.

Objectives

This study interrelates changes in Oklahoma population centers from 1930-40, 1940-50, and 1950-60 with eight independent variables, assumed to bear measurable linear functional associations with demographic movements. The objective is to account for the variations in the population changes of both the white and nonwhite residents.

Methods

Eight independent variables were selected to explain population changes of Oklahoma towns and cities. They were: (1) size of place at

The research reported herein was done under Station Project 1154.

*Professor and graduate assistant, respectively. The authors are indebted to Gladys K. Bowles and Calvin L. Beale, Farm Population Branch, Economic Research Service, United States Department of Agriculture, and Professors Otis Durant Duncan and Carl E. Marshall for their reviews and suggestions; to Mr. William R. Gurley for assistance in design and tests of hypotheses; and to Mmes. Pat Simpson and Memory Lewis for secretarial assistance.

the beginning of the decade; (2, 3, and 4) area, as broken down into three classifications: state economic areas, soil groups, and black belts (percentage of the 1910 county population nonwhite); (5) local governmental status; (6) censal decade; (7) type of road on which the town is situated; and (8) distance to the nearest place of 2,500 population and over. Hereafter the term "size" stands for size of place at the beginning of a decade, "government" stands for local governmental status (county seat or non-county seat classification), "decade" for censal decade, and "area" for one of the three area classifications.

The study was conducted as follows:

First, calculations were made of the numerical population gains and losses of the total, white, and nonwhite population of Oklahoma population centers from 1930 to 1940, 1940 to 1950, and 1950 to 1960. Figure 1 shows a frequency distribution of the changes in total population of all 1,541 towns and cities in the three decades.

Second, towns and cities were classified by one of the three decades to which the appropriate population changes relate.

Third, the places were classified into county seats or noncounty seats. Since one of the 77 county seats had less than 1,000 population and was unincorporated in 1930, there are 230 county seats with published populations for the three decades.

Fourth, the number of inhabitants was coded at the beginning of each decade for each place existing in two consecutive censuses. Table 1 shows the distribution of population centers, classified into nine sizes at the beginning of the decade.

Fifth, places were assigned to one of twelve geographic areas, using the 1960 census definitions of state economic and standard metropolitan statistical areas. The first nine are non-metropolitan state economic areas and the last three are standard metropolitan statistical areas (Figure 2, Table 2).

Sixth, places were divided into five soil areas. using the generalized soils classification of Oklahoma (Figure 3, Table 3).

Seventh, towns and cities were classified into four black-belt areas, using the percentage of each county's total population which was nonwhite in 1910 (Figure 4, Table 4).

Eighth, the 521 places existing in both 1950 and 1960 were classified according to the eight types of highways on which they were located in 1950 (Table 5).

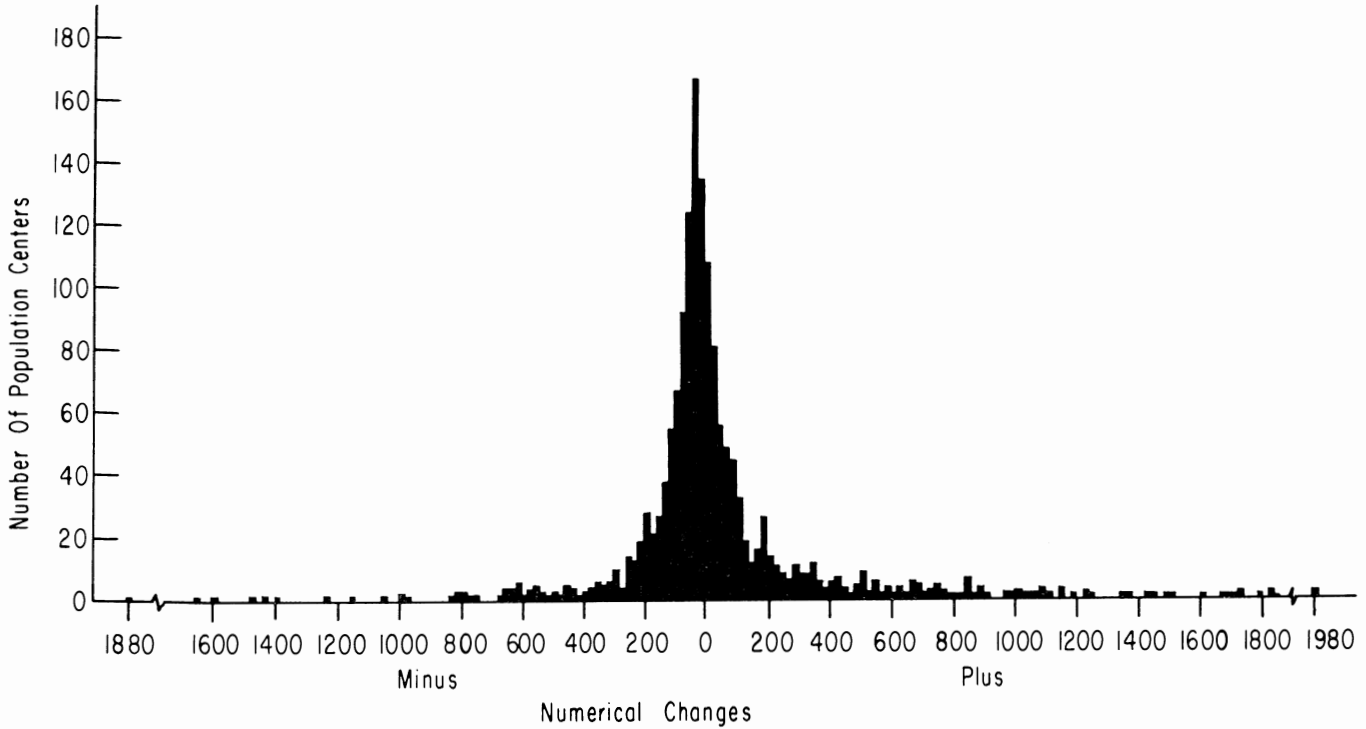

Figure 1. Frequency distribution of the population changes of Oklahoma's population centers, 1930-40, 1940-50, and 1950-60.

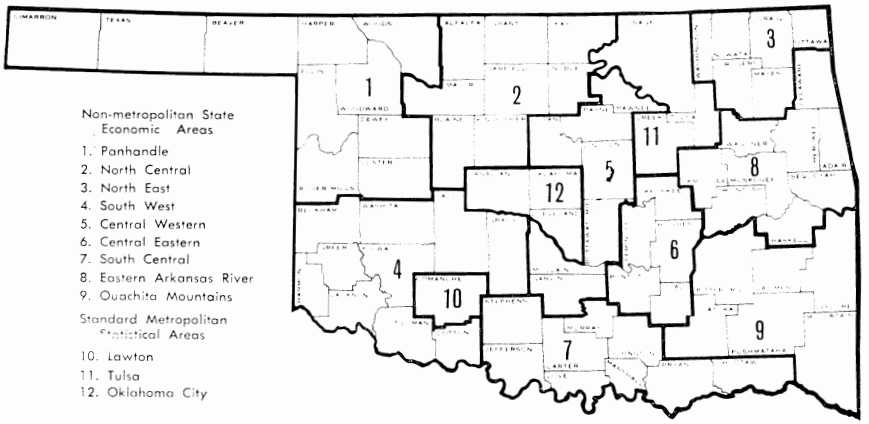

Figure 2. Oklahoma state economic areas and standard metropolitan statistical areas, 1960.

Ninth, road mileages were measured from each of the 521 places to the nearest center of 2,500 or more population in 1950 and were classified according to four distance intervals (Table 6). The two variables, type of road and distance to the nearest center of 2,500 or more population, enter into the analysis of population trends only for the last decade, that of 1950 to 1960.

Tenth, graphs were drawn for all possible two- through eight-factor interactions to find those likely to be significant. Probable interactions having one or more blank cells were excluded in the analysis which follows.

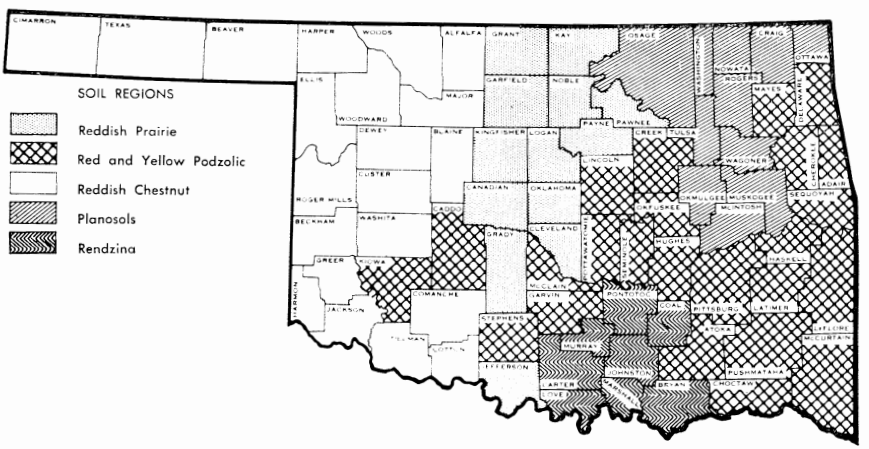

Figure 3. Oklahoma soil regions.

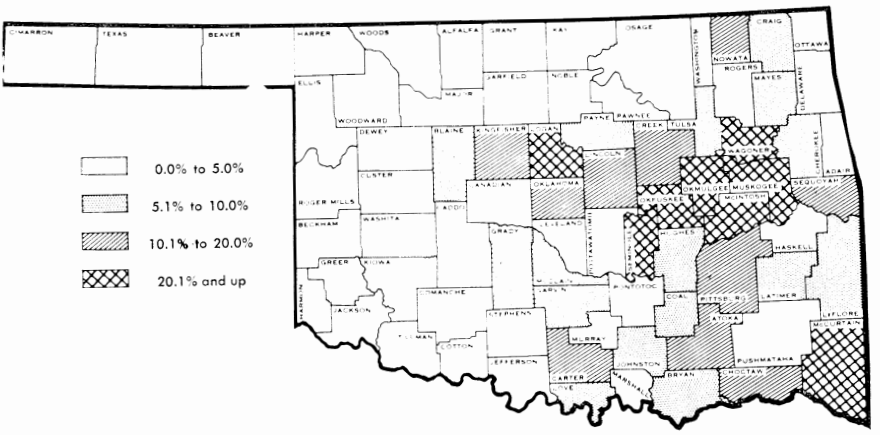

Figure 4. Oklahoma Black Belts—Percentage of population nonwhite by counties in 1910.

Eleventh, averages (means) of the numerical population changes of Oklahoma towns and cities were calculated for the eight independent variables (Table 7).

Hypotheses and Their Tests

The study uses the following three mathematical models to ascertain whether each of the eight independent variables and selected two-factor interactions exercises a selective influence on population changes:

$$Y_{ijklmp} = \mu + \alpha_i + \tau_j + \beta X_{ijklmp} + \gamma_k + \theta_l + \upsilon_m + \epsilon_{ijklmp}, \quad (1)$$

$$Y_{ijkp} = \mu + \alpha_i + \tau_j + \gamma_k + (\tau\gamma)_{jk} + \epsilon_{ijkp}, \quad (2)$$

$$Y_{jklmnop} = \mu + \tau_j + \beta X_{jklmnop} + \gamma_k + \theta_l + \upsilon_m + \omega_n + \lambda_o + \epsilon_{jklmnop}, \quad (3)$$

where α_i is the fixed effect of decade (censal decade), with i = 1, 2, and 3; τ_j is the fixed effect of government (county seats and noncounty seats), with j = 1 and 2; β is a partial regression coefficient associated with the covariable X, the population of each center at the beginning of the decade; γ_k is the fixed effect of state economic areas, with k = 1, ... 12; θ_l is the fixed effect of black belt areas, with l = 1, ... 4; υ_m is the fixed effect of soil areas, with m = 1, ... 5; ω_n is the fixed effect of 1950 highway facilities with n = 1, ... 8; λ_o is the fixed effect of distance to the nearest place of 2,500 or larger in 1950, with o = 1, ... 4; p= 1, ... 1,541, with the subscript p identifying each of the population centers; and $(\tau\gamma)$ is a two-factor interaction. In each of the three models the assumption is that the epsilons (ϵ's) are independent and normally

distributed with a mean of zero and a variance of sigma square [$\epsilon \sim$NID $(0, \sigma^2)$]. There are three dependent variables: Y_1, Y_2, and Y_3, respectively, the numerical population changes of the total, white, and nonwhite populations of Oklahoma towns and cities during a decade.

The first two models analyze the changes in the total, white, and nonwhite inhabitants for all three decades. The last model applies only to the 1950-60 decade. Due to the large number of variables and the limited capacity of the computer, it was impossible to include the six independent variables and the two-factor interaction in Models 1 and 2 into just one model.

Since the decennial censuses do not enumerate unincorporated places of less than 1,000 inhabitants, the universe of all Oklahoma population centers in 1930, 1940, 1950, and 1960 is unknown. Consequently, the study treats the reported places in each of the four years as samples of the total population of all centers; also, it considers these four censal years as random samples of all years and proceeds to test hypotheses about the population parameters.

The study employs the least squares method of solving simultaneous equations to test the following nine hypotheses:

1. $\alpha_1 = \alpha_2 = \alpha_3$.
2. $\tau_1 = \tau_2$.
3. $\beta = 0$.
4. $\gamma_1 = \ldots \gamma_{11} = \gamma_{12}$.
5. $\theta_1 = \ldots = \theta_4$.
6. $\upsilon_1 = \ldots = \upsilon_5$.
7. $\omega_1 = \ldots = \omega_8$.
8. $\lambda_1 = \ldots = \lambda_4$.
9. $(\tau\gamma) = 0$.

The nine hypotheses reduce the stated objectives to concrete mathematical expressions amenable to tests of significance. The first eight hypotheses, excluding number three, state that population changes are equal for all levels of each of the seven main effects (independent variables). Hypothesis number three states that the sum of squares which the covariable population-size removes is equal to zero. The last, hypothesis number 9, states that the two-factor interaction is equal to zero.

For the two Models 1 and 3, the study computes the sum of squares that each independent variable and the one covariable removes after first adjusting for the effect of every other independent variable and/or covariable. This computational procedure provides a precise measure-

ment of the influence of each independent variable in explaining population trends. Moreover, it provides an exact test of the hypotheses.

Results

Statewide Trends

The number of places enumerated by the Census Bureau in Oklahoma grew progressively from 512 in 1930, to 519 in 1940, to 529 in 1950, and 544 in 1960. The resident population of these places increased from 1,120,113 in 1930, to 1,160,206 in 1940, to 1,373,272 in 1950, to 1,684,540 in 1960. During this time the relative number living in the State's population centers rose from 47 percent of the total in 1930 to 72 percent in 1960.

This study analyzes the population changes in 506 places counted by the census both at the beginning and end of the 1930 to 1940 decade, 514 places in 1940 to 1950, and 521 places in both 1950 and 1960. The numerical and proportionate population gains rose each successive decade from 1930 to 1960 (Table 8).

The depression and Dust Bowl crisis uprooted thousands of people, creating a mass exodus from Oklahoma. Consequently, the 506 population centers experienced a gain of only 35,000 persons, or 3.2 percent, from 1930 to 1940. Small increases in whites more than offset losses in nonwhites.

World War II greatly accelerated population shifts, sending servicemen and civilian defense workers and their families here and there to meet war-time emergencies. The population of the 514 towns and cities grew by nearly 192,000 persons, or nearly 17 percent, from 1940 to 1950. Both the white and nonwhite residents of Oklahoma population centers increased numerically, with the proportionate gains for whites almost three times as great as those for nonwhites.

Between 1950 and 1960 population movements to Oklahoma towns and cities increased in tempo, as the outmovement from the State slackened somewhat. As a result, the 521 places grew from about 1,370,000 to 1,658,000 people, a gain of nearly 290,000 persons, or over one-fifth. The rate of increase of nonwhites in Oklahoma population centers was nearly twice that for whites. This represents a reversal in white-nonwhite population trends and may be due, at least in part, to a more complete census enumeration of Indians in 1960 than in 1950.[1]

[1] Apparently thousands of Oklahoma Indians were incorrectly enumerated as whites in 1950 by census takers. Therefore, it is impossible to ascertain precisely what proportion of the 1950 to 1960 gains in whites and nonwhites was due to errors in racial classifications.

From 1930 to 1960 the population of Oklahoma's towns and cities was quite fluid, responding in vast migratory movements to economic fluctuations. Most of the population gains occurred in and around the State's major cities, reflecting expansion in business and industrial activities and in military and defense installations. For example, only five of Oklahoma's 77 counties had population increases due to net migration from 1950 to 1960.

Size of Place. The magnitude of population gains is highly dependent upon the size of population center at the beginning of the decade because the numerical increases rise rapidly as size of place increases (Table 7). Size as a covariable overshadows all other independent variables in importance, explaining nearly 60 percent of the variability in numerical population shifts of Oklahoma centers in the 30-year period after adjusting for the effects of the other five independent variables (Table 9). In the last decade size of place exerted much more influence on population change, accounting for over 70 percent of the 1950-60 variability of population change after adjusting for the other six variables (Table 11). Therefore, the F-tests signify that size of place is highly significant in Models 1 and 3 (Tables 9 and 11).

Local Governmental Status. Population trends of county seat towns differed considerably from all other centers. For all three censal decades combined, county seats had much larger absolute population gains than other towns (Table 7). However, the population gains of county seats and non-county seats are somewhat complicated by the significant state economic area—local government interaction (Figure 5, Table 10).

The significant state economic area—county governmental interaction shows that the population gains of county seats in each of the twelve areas, excluding Area 6, greatly outstripped those of non-county seats between 1930 and 1960 (Figure 5). Area 6 experienced a general depopulation after the oil boom of the late 1920's. In fact, Seminole was the State's third most populous county in 1930, but by 1960 the population had declined by over 60 percent and one of its townships by 95 percent.

Censal Decade. The absolute population gains of Oklahoma towns and cities rose each successive decade during the 30-year period, averaging 70 persons per population center in 1930-40, 374 persons in 1940-50, and 552 persons per place in 1950-60 (Table 7). Accordingly, decade was a significant factor in accounting for numerical population increases (Model 1, Table 9). There were significant differences be-

tween the first and second and first and third decades but not between the second and third decades (Table 12).

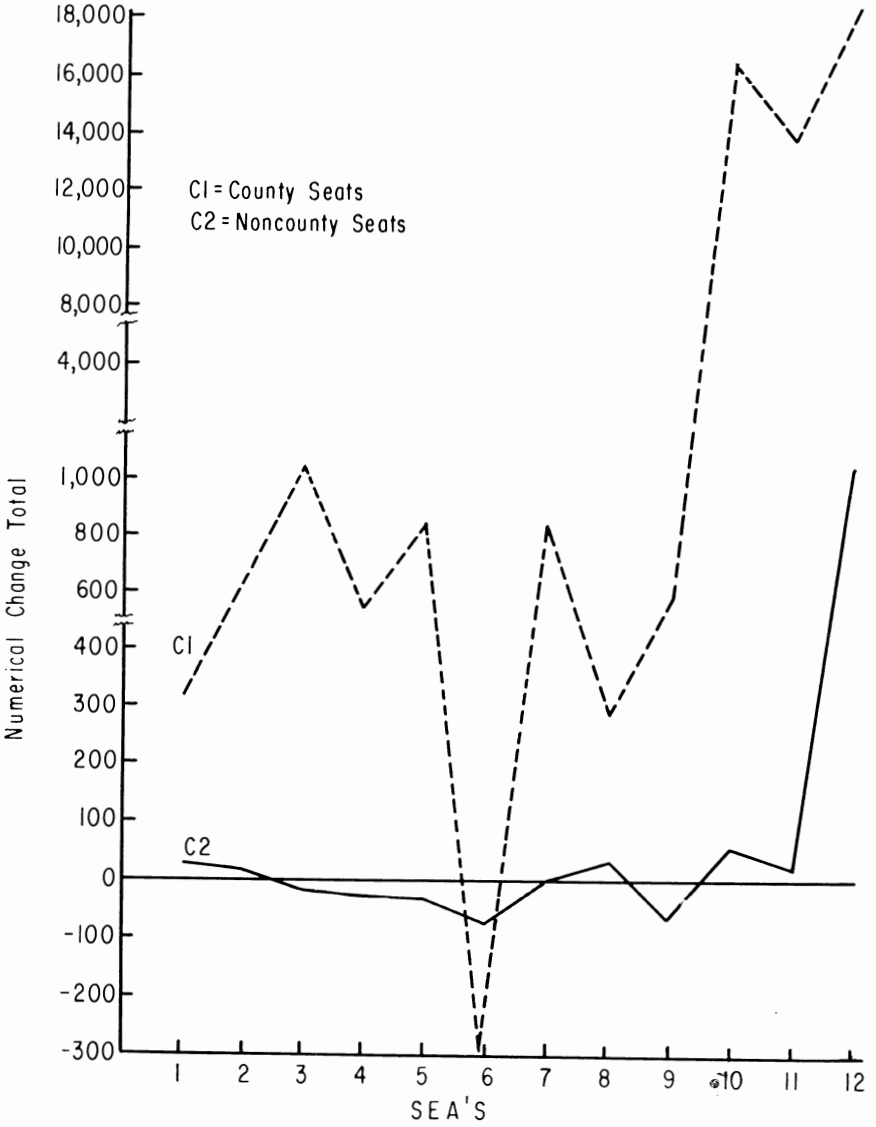

Figure 5. Numerical population changes of Oklahoma population centers, 1930-40, 1940-50, and 1950-60, showing the interaction between local governmental status—state economic areas.

Geographic Areas.

State Economic Area.— Of the three regional classifications, state economic area exerted the greatest influence on trends in Oklahoma population centers during the three decades. On the basis of size of the variance ratios, state economic area was the fourth most important variable in explaining demographic changes in Oklahoma towns and cities (Table 9). Moreover, state economic area was a significant factor in accounting for population shifts, even after adjusting for the effects of decade, local government, population-size, soil region, and black belt.

Trade and service centers in the nine non-metropolitan areas had rather stable populations throughout 1930 to 1960, gaining or losing by not more than 100 to 200 persons per decade (Table 7). Those centers in the metropolitan areas experienced large increases and all—except those in Areas 10 and 11 in the first decade—had gains of 1,000 or more persons each decade.

Area 12 (Oklahoma City Area) had significantly higher increases in the number of inhabitants than all of the other areas from 1930 to 1960, excluding Area 10, Comanche County (Table 12). Area 10, in turn outgained each of the other areas, except Area 12.

T-tests for state economic areas in the 1950-60 decade remained basically the same as for the 30-year period for Areas 10 and 12. However, in the 1950-60 decade Areas 1, 2, 3, and 4 had significantly higher gains than Area 5 (Central-Western). Area 11 (Tulsa) had significantly higher gains than Areas 2, 3, 5, 6, and 9 (Table 13).

Places in Area 6 (Central Oklahoma-Eastern Area) had a significantly greater population loss than all other 11 areas during the 30-year period and greater than eight areas from 1950 to 1960 (Tables 12 and 13). In fact, Area 6 had the largest population losses of any non-metropolitan area in the nation in both 1940-50 and 1950-60.

The graph of the 1930 to 1960 population changes of county seats and non-county seats shows that State Economic Area 6 deviated from statewide tendencies, thus giving a significant two-factor interaction of local government—state economic area (Figure 5, Table 10). In 1950-60 county seats had smaller gains than non-county seats in Area 9 and Area 6.

The numerical population changes of Oklahoma towns and cities are highly variable, especially in Areas 10, 11, and 12, which contain the

State's three largest cities (Figure 2, Table 7). Moreover, Bartlett's test indicates unequal variances among the twelve state economic areas.[2] For that reason, some of the analysis of variance tables contain rather large sums of squares. However, the actual population changes are employed in this study, because various transformations were unsuccessful in yielding homogeneous variances. Thus, the significance levels and confidence limits on both the F- and t-tests must be taken as approximate rather than exact.

Black Belt.—There are no real differences in population trends in the four different racial areas existing in 1910; those centers in Black-Belt Areas 2 and 3 experienced the largest increases from 1930 to 1960 (Table 7, Figure 4). Therefore, the geographic areas based on the concentration of nonwhites in 1910, by counties, have a negligible influence upon population changes in towns and cities (Tables 9 and 11).

Soil Region.—Population trends of Oklahoma towns and cities vary only slightly among the five major soil regions (Table 7, Figure 3). However, these differences disappear when the population centers are adjusted for the effect of the other five independent variables in Model 1 and for the other six independent variables in Model 3 (Tables 9 and 11).

Highway Routes. The 1950-60 population changes of Oklahoma towns and cities were influenced appreciably by highway connections. Centers located at the most strategic junctions in 1950 outgained all other places (Table 7). The variance ratio reveals that highways did exert a significant influence upon 1950-60 population trends, after adjusting for the effect of the six other independent variables (Table 11).

Population centers located at the intersection of federal highways (Type 1) outgained centers on all other seven types of roads (Table 14). On the other hand, towns and cities on the junction of major state highways had significantly greater losses than places on the other types of highways; places on unimproved roads (Type 8) experienced greater declines than those on highway Types 1, 3, 4, and 5; and population centers on other "improved" roads (Type 7) had larger declines than centers on highway Types 1, 3, and 4 (Table 14).

Proximity to Urban Centers. From 1950 to 1960 there was an inverse relationship between population growth and nearness to places

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[2] Bartlett's, Cochran's and Hartley's tests are frequently employed to test for the homogeneity of variances. Apparently each of the three is over-sensitive to departures from normality of the distributions of the basic observations.

of 2,500 or more inhabitants (Table 7). However, the influence of distance upon population change vanishes after adjusting towns and cities for the effects of the other six independent variables in Model 3 (Table 11).

Major Racial Groups

Size of Place. Population-size has been the most important independent variable affecting changes in the number of white and nonwhite inhabitants in Oklahoma centers since 1930 (Tables 9 and 11). However, nonwhites are concentrating in the large urban centers at a somewhat faster pace than whites, for the average nonwhite population gains in places of 5,000 and over are very large, comparatively (Table 7). On the other hand, places of 1,500 and over in each of the three decades consistently registered white population increases, with the average gains per decade rising rapidly as size of place climbed (Table 7).

Local Governmental Status. Both the white and nonwhite population gains in county seats surpassed those in non-county seat towns in Oklahoma (Table 7). There were significant differences between county seats and all other places during the entire 30-year period (Table 10). Also, there were significant differences between county seats and non-county seats during the 1950-60 decade after adjusting for the effects of the other six independent variables (Tables 11).

However, the significant differences in white population gains in favor of county seats disappear during the entire 30-year period after adjusting for the effects of the other five independent variables (Table 9). County seats had higher population increases during the three decades but the variance ratio was too small to reject the hypothesis that white population changes in the two types of centers are equal (Table 9).

Both the white and nonwhite populations have the same significant two-factor interactions of county governmental function—state economic area as that of the total population during the three decades (Table 10). These divergent white-nonwhite population trends generally follow those for the total population from 1930 to 1960 (Figures 5, 6, and 7).

Censal Decade. Both white and nonwhite populations of Oklahoma towns and cities have risen with each successive decade (Table 7). After a small loss in 1930-40, the nonwhites had small increases in the population centers in 1940-50 and even larger ones in 1950-60. Hence, there are significant population changes among the three censal decades after first adjusting for all other independent variables (Table 9).

The t-tests reveal that the significant differences for whites are between the first and second and first and third decades and for nonwhites between the first and third and second and third decades (Table 15).

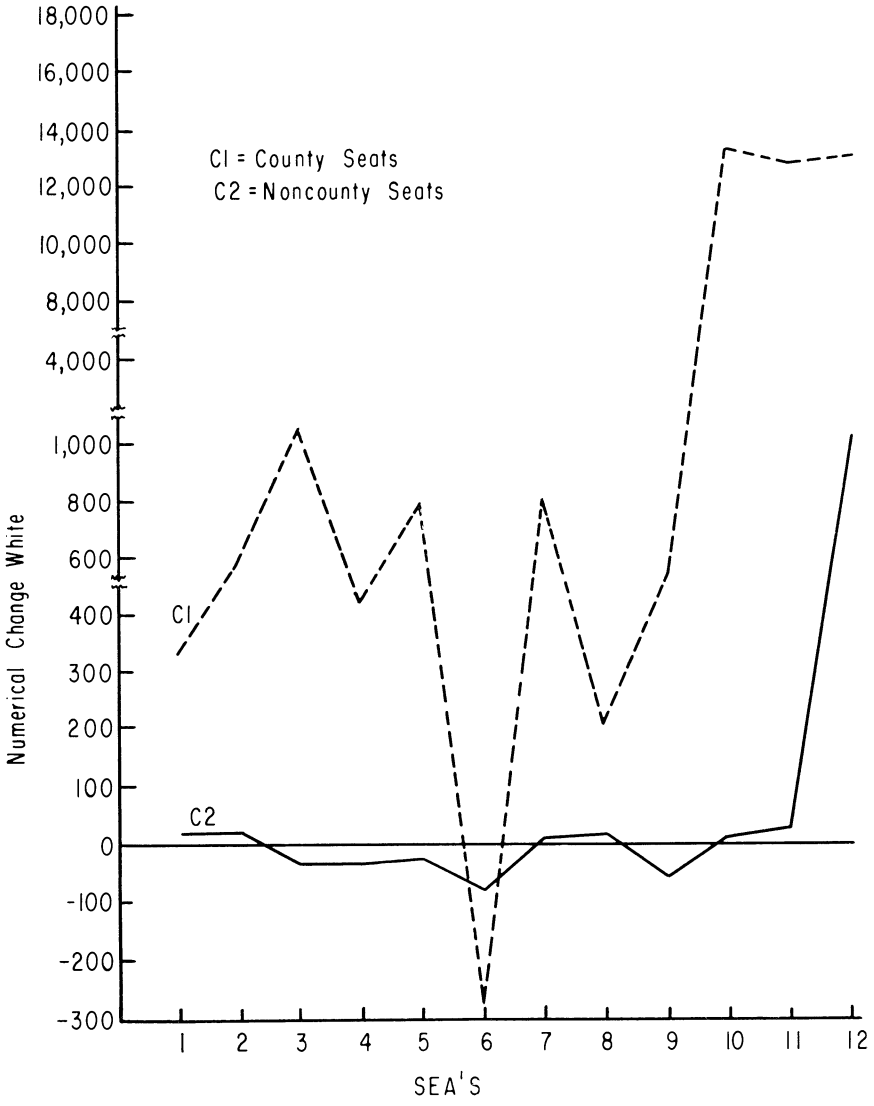

Figure 6. Numerical population changes of the white population of Oklahoma population centers, 1930-40, 1940-50, and 1950-60, showing the interaction between local governmental status—state economic areas.

Geographic Areas.

State Economic Areas.— The influence of state economic areas on white and nonwhite population trends corresponds rather closely with that of the total population of Oklahoma towns and cities (Table 7).

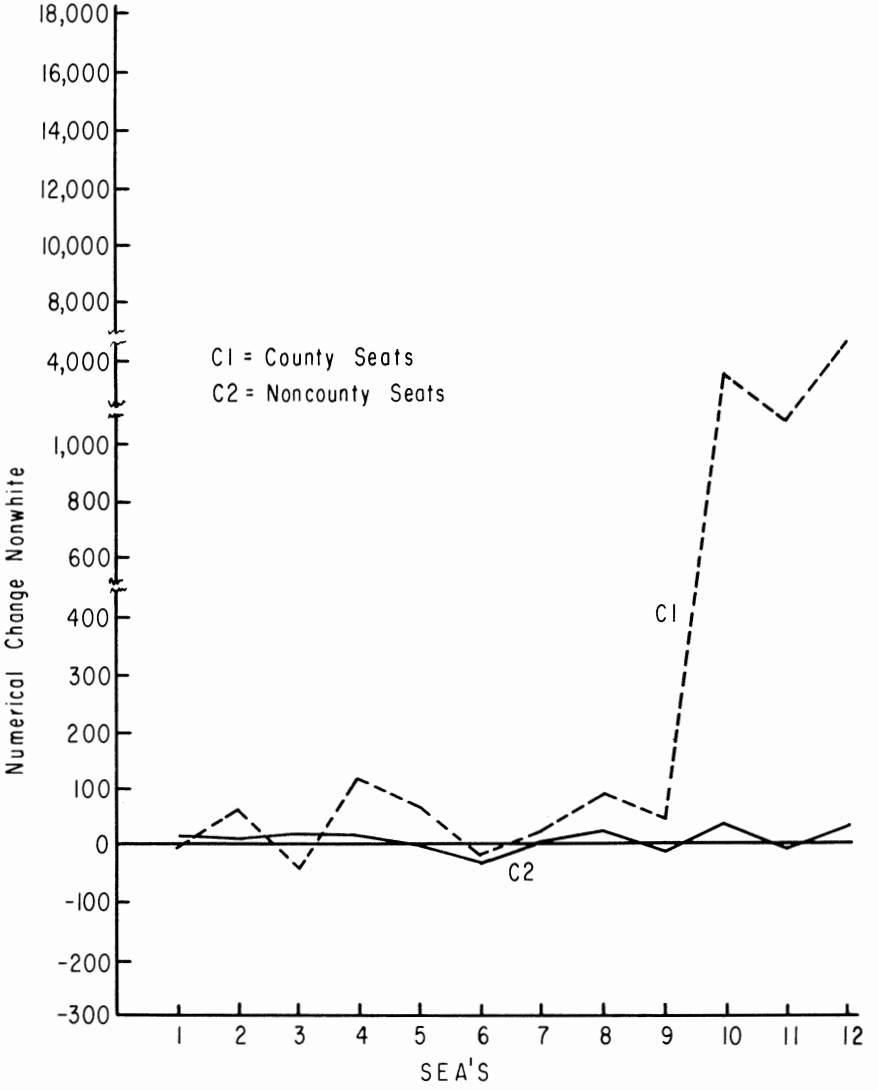

Figure 7. Numerical population changes of the nonwhite population of Oklahoma population centers, 1930-40, 1940-50, and 1950-60, showing the interaction between local governmental status—state economic areas.

State economic area is a significant main effect for both the white and nonwhite segments of the population (Model 2, Table 10) but when adjusted for all other independent variables the differences for the nonwhites disappear (Models 1 and 3, Tables 9 and 11). Moreover, a significant local governmental function—state economic area interaction exists for both the white and nonwhite populations (Model 2, Table 10).

The white population in Area 12 (Oklahoma City) experienced greater gains than all other areas, except Area 10 (Lawton), and Area 10 experienced greater gains than all other areas except Area 12 (Table 15). Areas 10 and 12 both gained approximately the same in white population.

In the 1950-60 decade, there were about the same significant white population gains for Areas 10 (Lawton) and 12 (Oklahoma City) as for the 30-year period (Table 16). However Area 11 (Tulsa) had significantly higher 1950-60 white population gains than all other areas except Areas 1, 7, 10, and 12 (Table 16).

The white population in county seats outgained that in non-county seats in all areas except Area 6 (Figure 6). For the nonwhites, county seats in Areas 1 and 3 sustained heavier losses than the non-county seat centers (Figure 7).

Black Belt.— After adjusting for all other independent variables, the 1910 racial area classification of counties fails to explain a significant proportion of the variability of the white and nonwhite population changes (Tables 9 and 11).

Soil Region.— This geographic classification exerted no appreciable influence upon population changes in Oklahoma towns and cities during the period of study (Tables 9 and 11).

Highway Routes. Highways had a significant influence on 1950-60 nonwhite population changes but not upon white population changes (Table 11).

Nonwhites had significantly higher gains in population centers located on Type 1 highways than in those centers located on all other types of roads. Nonwhites in centers located on Type 2 highways showed greater gains than in centers located on Type 3, 4, 5, 6, 7, and 8 highways. Nonwhites showed greater gains in centers on Type 3 highways than in centers on Type 4, 5, 6, 7, and 8 highways. Centers on Type 4 highways had greater nonwhite gains than centers on Type 5, 6, 7, and 8 highways. Centers on Type 5 highways had greater nonwhite gains than those centers on Type 6 highways. Centers on Type 6 highways

showed greater nonwhite gains than centers on Type 8 highways (Table 17). In fact, all but four of the twenty-eight pairs of adjusted means of the 1950-60 nonwhite population trends for the various types of roads were significant.

Proximity to Urban Centers. Both the white and nonwhite 1950-60 population gains dropped as distance from the nearest city in 1950 increased (Table 7). Nonetheless, distance is not a significant variable in explaining population changes after adjusting for the effects of the other six independent variables (Table 11).

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Table 1. Distribution of Oklahoma Population Centers, by Size at the Beginning of the Decade, 1930-40, 1940-50, and 1950-60.

Number of Size Group	Population Interval	Number of Places			Total For Three Decades
		1930-40	1940-50	1950-60	
1	Under 500	233	247	261	746
2	500-999	102	107	91	300
3	1,000-1,499	44	45	41	130
4	1,500-2,499	54	41	43	138
5	2,500-4,999	30	31	38	99
6	5,000-9,999	22	22	24	68
7	10,000-24,999	12	17	17	46
8	25,000-49,999	2	2	4	8
9	50,000 and Over	2	2	2	6
	Total	506	514	521	1,541

Table 2. Number of Oklahoma Population Centers in each of the 1960 State Economic and Standard Metropolitan Statistical Areas, 1930-40, 1940-50, and 1950-60.

Area	Number of Places			Total For Three Decades
	1930-40	1940-50	1950-60	
Nonmetropolitan State Economic Areas				
1. Panhandle	49	49	50	148
2. North Central	66	67	67	200
3. Northeast	38	42	42	122
4. Southwest	64	66	66	196
5. Central-Western	61	63	63	187
6. Central-Eastern	27	27	27	81
7. South Central	51	51	53	155
8. Eastern Ark. River	52	52	52	156
9. Ouachita Mountains	35	35	38	108
Standard Metropolitan Statistical Areas				
10. Lawton	9	9	9	27
11. Tulsa	38	37	33	108
12. Oklahoma City	16	16	21	53
Total	506	514	521	1,541

Table 3. Number of Oklahoma Population Centers, by Soil Region, 1930-1940, 1940-1950, and 1950-1960.

Soil Regions	Number of Places			Total For Three Decades
	1930-40	1940-50	1950-60	
1	101	102	107	310
2	159	165	167	491
3	115	116	117	348
4	91	91	87	269
5	40	40	43	123
Total	**506**	**514**	**521**	**1,541**

Source: Part V, "Soils of the United States, in United States Department of Agriculture, Yearbook of Agriculture, 1938, pp. 1019-1161.

Table 4. Number of Oklahoma Population Centers, by Black Belt Areas (Percentage Nonwhite in 1910), 1930-1940, 1940-1950, and 1950-1960.

Black Belt	Number of Places			Total For Three Decades
	1930-40	1940-50	1950-60	
1	276	276	279	831
2	96	105	106	307
3	73	73	76	222
4	61	60	60	181
Total	506	514	521	1,541

Table 5. Oklahoma Population Centers Present during 1950-60, by Type of Highway Connection, 1950.

Type of Road*	Number of Places
1	41
2	87
3	22
4	68
5	35
6	138
7	88
8	42
Total	521

*The eight types of highway routes are as follows:
1. Junction of federal highways.
2. Junction of federal and major state highways.
3. Junction of federal and minor state highways.
4. Junction of major state highways.
5. Junction of major and minor state highways.
6. Junction of minor state highways.
7. Junction of other "improved" roads.
8. Other roads.

Table 6. Oklahoma Population Centers During 1950-1960, by Distance to the Nearest Urban Center, 1950.

Number of Interval	Distance Interval (Miles by Nearest Highway)	Number of Places
1	Under 15 Miles	239
2	15 to 29 Miles	235
3	30 to 44 Miles	41
4	45 Miles and Over	6
	Total	521

Table 7. Means of Numerical Population Changes of Oklahoma Towns and Cities, Classified by Each Independent Variable, 1930 to 1960.

Variable	Total			White			Nonwhite		
	1930-1940	1940-1950	1950-1960	1930-1940	1940-1950	1950-1960	1930-1940	1940-1950	1950-1960
ALL PLACES	70	374	552	78	362	472	—8	12	80
GOVERNMENT									
County Seats	752	2,256	2,953	752	2,142	2,480	—1	114	474
Noncounty Seats	—52	42	135	—43	54	123	—9	25	12
STATE ECONOMIC AREAS									
Nonmetropolitan State Economic Areas	20	154	66	32	155	47	—11	—2	19
1. Panhandle	—44	203	109	—35	189	95	—8	14	13
2. North Central	43	174	65	44	171	50	—1	3	14
3. Northeast	87	157	348	160	169	305	—73	—12	43
4. Southwest	—76	105	153	—84	85	131	8	19	22
5. Central Western	—57	232	12	—60	237	10	3	—4	2
6. Central Eastern	122	—211	—262	83	—130	—276	38	—81	13
7. South Central	130	165	136	139	169	131	—9	—4	4
8. Eastern Ark. River	18	240	—41	59	157	—106	—41	—17	65
9. Ouachita Mts.	74	126	—77	103	94	—66	—29	32	—10
Standard Metropolitan Statistical Areas	418	1,973	4,066	396	1,857	3,552	22	116	524
10. Lawton	699	1,866	3,075	628	1,611	2,647	71	255	428
11. Tulsa	—75	1,127	2,615	—9	1,081	2,371	—65	46	243
12. Oklahoma City	1,432	3,989	6,802	1,229	3,790	5,796	203	199	1,005
SIZE OF PLACE									
Under 500	1	—33	—9	8	—32	—12	—7	—1	3
500-999	—32	0	—5	—15	1	—23	—17	—2	18
1,000-1,499	—49	79	—2	—38	79	3	—11	0	—4
1,500-2,499	16	226	123	44	253	110	—28	—28	13
2,500-4,999	75	493	549	64	467	548	11	27	2
5,000-9,999	109	891	1,002	164	901	852	—55	—10	150
10,000-24,999	1,098	3,532	2,549	1,055	3,437	2,376	43	95	173
25,000-49,999	994	6,447	9,240	990	6,265	8,003	5	182	1,237
50,000 and over	9,967	39,832	79,847	9,069	37,089	66,174	898	2,743	13,674

Table 7. (con't)

Variable	Total			White			Nonwhite		
	1930-1940	1940-1950	1950-1960	1930-1940	1940-1950	1950-1960	1930-1940	1940-1950	1950-1960
SOIL REGIONS									
1. Reddish Prairie	255	836	1,359	220	813	1,163	34	33	196
2. Red & Yellow Podzolic	2	100	24	10	112	4	—7	—12	20
3. Reddish Chestnut	6	266	365	0	233	310	—5	28	55
4. Planosols	—11	620	1,039	60	539	959	—72	22	129
5. Rendzina	240	38	3	244	63	11	—3	—24	—8
BLACK BELT									
1. 0.0-5.0 percent	9	254	260	19	233	227	—10	15	32
2. 5.1-10.0 "	123	593	835	163	557	755	—40	26	79
3. 10.0-20.0 "	289	733	1,771	254	709	1,475	34	24	295
4. 20.1 & over	—2	96	—139	7	134	—169	5	—38	29
HIGHWAY (JUNCTION OF)									
1. Federal			4,659			3,881			778
2. Federal-Major State			1,171			1,083			88
3. Federal-Minor State			16			—5			21
4. Major State			—78			—84			7
5. Major-Minor State			16			4			11
6. Minor State			27			23			4
7. Other "Improved"			—44			—51			7
8. Other Roads			—23			—18			—5
DISTANCE TO NEAREST CITY									
1. Under 15 Miles			926			794			132
2. 15-29 Miles			255			211			44
3. 30-44 Miles			151			151			0
4. 45 & Over			1			4			—4

Table 8. Population Changes of All Oklahoma Towns and Cities Enumerated at Both the Beginning and End of Each Census Decade 1930-1940, 1940-1950, and 1950-1960.

Race and Decade	Population on the Initial Census Date	Population on the Terminal Census Date	Change Numerical	Change Percentage
1950-1960	1950	1960		
Total Population	1,370,534	1,657,898	287,364	21.0
Whites	1,258,574	1,504,139	245,565	19.5
Nonwhites	111,960	153,759	41,799	37.3
1940-1950	1940	1950		
Total Population	1,156,411	1,348,394	191,983	16.6
Whites	1,051,146	1,236,681	185,535	17.7
Nonwhites	105,265	111,713	6,448	6.1
1930-1940	1930	1940		
Total Population	1,118,902	1,154,387	35,485	3.2
Whites	1,010,169	1,049,450	39,281	3.9
Nonwhites	108,733	104,937	—3,796	—3.5

Table 9. Analysis of Variance of the Total, White, and Nonwhite Population Changes of Oklahoma Towns and Cities, 1930-1960 (Model 1).

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	Calculated Variance Ratio
		Total		
Total	1,541	19,279,521,263		
R (μ)	1	171,998,650		
R (due to Model $\mid\mu$)	22	13,163,898,163		
Population-Size [β (adjusted)]	1	11,193,965,000	11,193,965,000	2,858.94**
County Seat [τ (adj.)]	1	31,054,260	31,054,260	7.93**
Censal Decade [α (adj.)]	2	33,403,275	19,204,137	4.90*
State Economic Area [γ (adj.)]	11	103,109,750	9,828,159	2.51*
Black Belt [θ (adj.)]	3	10,380,116	3,460,039	.88
Soil Region [υ (adj.)]	4	2,794,147	698,539	.18
Error	1,518	5,943,624,455	3,915,431	
		White		
Total	1,541	14,450,452,100		
R (μ)	1	143,586,470		
R (due to Model $\mid\mu$)	22	9,597,318,422		
Population-Size [β (adjusted)]	1	8,103,783,300	8,103,783,300	2,612.04**
County Seat [τ (adj.)]	1	11,505,429	11,505,429	3.71
Censal Decade [α (adj.)]	2	27,720,757	13,860,379	4.47*
State Economic Area [γ (adj.)]	11	89,190,975	8,108,270	2.61*
Black Belt [θ (adj.)]	3	11,894,847	3,964,949	1.28
Soil Region [υ (adj.)]	4	1,962,102	490,526	.16
Error	1,518	4,709,547,208	3,102,469	

Table 9 Continued

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	Calculated Variance Ratio
		Nonwhite		
Total	1,541	509,171,665		
R (μ)	1	1,282,213		
R (due to Model $\mid\mu$)	22	280,325,807		
Population-Size [β (adjusted)]	1	248,943,380	248,943,380	166.06**
County Seat [τ (adj.)]	1	4,735,577	4,735,577	31.72**
Censal Decade [α (adj.)]	2	1,385,954	692,977	4.62*
State Economic Area [γ (adj.)]	11	1,597,997	145,272	.97
Black Belt [θ (adj.)]	3	94,663	31,554	.21
Soil Region [υ (adj.)]	4	505,537	126,384	.84
Error	1,518	227,563,645	149,910	

Table 10. Analysis of Variance of the Total, White, and Nonwhite Population Changes of Oklahoma Towns and Cities, 1930-1960 (Model 2).

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	Calculated Variance Ratio
		Total		
Total	1,541	19,279,521,268		
R (μ)	1	171,998,650		
R (due to Model $\mid\mu$)	23	5,548,901,340		
County Seat ($\tau \mid \mu$)	1	749,159,190	749,159,190	83.81**
State Eco. Area ($\gamma \mid \mu, \tau$)	11	1,105,529,996	100,502,727	11.24**
Interaction ($\tau\gamma \mid \mu, \tau, \gamma$)	11	3,694,212,154	325,837,469	37.57**
Error	1,517	13,558,621,278	8,937,786	
		White		
Total	1,541	14,450,452,100		
R (μ)	1	143,586,470		
R (due to Model $\mid\mu$)	23	4,100,070,190		
County Seat ($\tau \mid \mu$)	1	605,304,750	605,304,750	89.96**
State Eco. Area ($\gamma \mid \mu, \tau$)	11	865,277,329	78,661,575	11.69**
Interaction ($\tau\gamma \mid \mu, \tau, \gamma$)	11	2,629,488,111	239,044,374	35.53**
Error	1,517	10,206,795,440	6,728,276	
		Nonwhite		
Total	1,541	509,171,665		
R (μ)	1	1,282,213		
R (due to Model $\mid\mu$)	23	92,452,179		
County Seat ($\tau \mid \mu$)	1	7,306,299	7,306,299	26.68**
State Eco. Area ($\gamma \mid \mu, \tau$)	11	15,467,946	1,406,176	5.13**
Interaction ($\tau\gamma \mid \mu, \tau, \gamma$)	11	69,677,934	6,334,357	20.13**
Error	1,517	415,437,273	273,854	

Table 11. Analysis of Variance of the Total, White, and Nonwhite Population Changes of Oklahoma Towns and Cities, 1950-1960 (Model 3).

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	Calculated Variance Ratio
		Total		
Total	521	14,704,994,000		
R (μ)	1	158,450,638		
R (due to Model $\mid\mu$)	30	12,897,230,278		
Population-Size [β (adjusted)]	1	10,493,068,000	10,493,068,000	3,117.42**
County Seat [τ (adj.)]	1	53,481,530	53,481,530	15.89**
State Eco. Area [γ (adj.)]	11	76,219,540	6,929,049	2.05*
Black Belt [θ (adj.)]	3	11,179,509	3,726,503	1.11
Soil Region [υ (adj.)]	4	3,998,726	999,681	.30
Highways [ω (adj.)]	7	52,353,936	7,479,141	2.22*
Distance [λ (adj.)]	3	820,215	206,738	.06
Error	490	1,649,313,084	3,365,945	
		White		
Total	521	10,513,560,800		
R (μ)	1	11,566,301		
R (due to Model $\mid\mu$)	30	8,967,124,552		
Population-Size [β (adjusted)]	1	6,985,118,400	6,985,118,400	2,229.97**
County Seat [τ (adj.)]	1	33,664,898	33,664,898	10.75**
State Eco. Area [γ (adj.)]	11	65,626,876	5,966,080	1.90*
Black Belt [θ (adj.)]	3	10,960,419	3,653,473	1.17
Soil Region [υ (adj.)]	4	3,642,325	910,581	.29
Highways [ω (adj.)]	7	37,449,245	5,349,892	1.71
Distance [λ (adj.)]	3	1,238,062	412,687	.13
Error	490	1,534,869,947	3,132,388	

Table 11 Continued

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	Calculated Variance Ratio
		Nonwhite		
Total	521	465,107,800		
R (μ)	1	33,600		
R (due to Model μ)	30	415,720,858		
Population-Size [β (adjusted)]	1	355,654,370	355,654,370	3,531.08**
County Seat [τ (adj.)]	1	2,272,603	2,272,603	22.56**
State Eco. Area [γ (adj.)]	11	1,788,726	162,611	1.61
Black Belt [θ (adj.)]	3	342,311	114,104	1.13
Soil Region [υ (adj.)]	4	353,545	88,386	.88
Highways [ω (adj.)]	7	2,140,881	305,840	3.04**
Distance [λ (adj.)]	3	61,993	20,664	.21
Error	490	49,353,342	100,721	

Table 12. T-Tests for Differences Between All Pairs of Means of Total Population Changes for Censal Decades and State Economic Areas, 1930-1960 (Model 1).

Variable	Calculated t Values											
	Decade		State Economic Area									
Decade	2	3	2	3	4	5	6	7	8	9	10	11	12
1	—2.36*	—2.97**											
2		— .60											
State Economic Area													
1			1.28	— .31	1.89	1.41	3.07**	— .18	— .25	.73	—10.05**	.64	— 8.24**
2				—1.26	.47	.39	2.35*	—1.27	—1.24	— .24	—10.45**	— .24	—10.88**
3					1.62	1.64	3.20**	.15	.09	1.08	— 7.79**	1.34	— 7.20**
4						— .05	2.18*	—1.63	—1.66	— .61	—11.07**	— .57	—10.06**
5							2.45*	—1.72	—1.82	— .65	— 9.98**	— .56	—10.61**
6								—3.96**	—3.83**	—2.86**	—10.32**	—2.12*	— 9.95**
7									— .08	.99	— 8.33**	1.08	— 8.08**
8										1.17	— 8.09**	1.42	— 7.49**
9											— 8.94**	.23	— 8.63**
10												8.70**	1.75
11													— 8.43**

Table 13. T-Tests for Differences Between All Pairs of Means of Total Population Changes for State Economic Areas, 1950-1960 (Model 3).

Variable	Calculated t Values										
State Economic Area	State Economic Area										
	2	3	4	5	6	7	8	9	10	11	12
1	1.87	.74	1.37	4.86**	2.96**	.83	1.79	2.15*	— 6.66**	— .04	—23.70**
2		—1.28	— .68	2.06*	3.01**	—1.01	.83	1.55	—15.08**	—3.11**	—10.89**
3			.46	3.14**	2.14*	.12	4.70**	1.33	— 9.12**	—3.52**	—24.23**
4				2.67**	3.33**	— .25	1.39	2.07*	—12.99**	—2.03*	— 9.04**
5					.55	—2.95**	—1.14	— .61	—23.90**	—4.59**	—11.88**
6						—1.86	—1.01	— .70	— 1.11	—2.93**	—30.15**
7							.89	1.25	— 9.24**	— .90	—27.02**
8								.24	—10.00**	—1.56	—27.80**
9									—10.52**	—2.05*	—30.12**
10										8.47**	.29
11											—22.22**

Table 14. T-Tests for Differences Between All Pairs of Means of Total Population Changes for Highways, 1950-1960 (Model 3).

Variable	Calculated t Values						
	Highways						
Highways	2	3	4	5	6	7	8
1	—10.72**	—3.02**	—7.27**	—7.30**	— 9.66**	— 9.43**	— 9.40**
2		5.49**	3.25**	1.57	1.20	.70	— .76
3			—3.06**	—3.67**	— 4.95**	— 4.99**	— 5.51**
4				—1.12	— 2.59**	— 2.77**	— 3.61**
5					— .78	— 1.03	— 2.09*
6						— .44	— 1.89
7							— 1.44

Table 15. T-Tests for Differences Between All Pairs of Means of the White and Nonwhite Population Changes for Censal Decades and State Economic Areas, 1930-1960 (Model 1).

Variable	Calculated t Values											
	Decade		State Economic Area										
	2	3	2	3	4	5	6	7	8	9	10	11	12
									Whites				
Decade													
1	—2.49*	—2.69**											
2		— .20											
State Economic Area													
1			1.32	.04	2.06*	1.43	3.12**	— .27	.04	.76	— 9.89**	.18	— 8.84**
2				— .91	.44	.37	2.37*	—1.40	— .96	— .23	—10.31**	— .77	—11.63**
3					1.34	1.26	2.91**	— .29	— .00	— .72	— 7.92**	.20	— 8.05**
4						— .19	2.11*	—1.85	— 1.45	— .71	—11.00**	— 1.20	—10.81**
5							2.49*	—1.85	— 1.47	— .63	— 9.85**	— 1.12	—11.32**
6								—4.10**	— 3.56**	— 2.87**	—10.22**	— 2.83**	—10.52**
7									.32	1.12	— 8.14**	.44	— 8.60**
8										.85	— 8.17**	1.85	— 8.29**
9											— 8.83**	— .58	— 9.23**
10												8.08**	1.17
11													—8.39**
									Nonwhites				
Decade													
1	— .88	—2.92**											
2		—2.17*											

Table 16. T-Tests for Differences Between All Pairs of Means of the White Population Changes for State Economic Areas, 1950-1960 (Model 3).

Variable	Calculated t Values										
State Economic Area	State Economic Area										
	2	3	4	5	6	7	8	9	10	11	12
1	1.73	1.27	1.27	4.43**	2.92**	.81	1.23	1.97*	— 6.22**	.73	—22.89**
2		— .03	— .63	.32	3.12**	— .94	1.83	1.38	—14.07**	—4.35**	—10.44**
3			— .63	1.89	1.13	— .46	4.33**	.68	— 9.14**	—8.89**	—25.00**
4				2.41*	3.39**	— .23	2.23*	1.87	—12.12**	—3.19**	— 9.02**
5					.83	—2.67**	— .19	— .54	—22.17**	—5.33**	—11.29**
6						—1.88	— .61	— .83	—10.53**	—3.53**	—29.28**
7							1.36	1.14	— 8.62**	—1.50	—25.92**
8								— .21	— 9.93**	—2.49*	—28.32**
9									— 9.78**	—2.49*	—28.71**
10										7.15**	— .28
11											—19.43**

Table 17. T-Tests for Differences Between All Pairs of Means of the Nonwhite Population Changes for Types of Highways, 1950-1960 (Model 3).

Variable	Calculated t Values						
	Highways						
Highways	2	3	4	5	6	7	8
1	— 3.15**	—2.54*	—3.46**	—3.67**	— 4.29**	— 4.14**	— 3.74**
2		—2.64**	—7.12**	—7.88**	—16.43**	—15.38**	— 4.98**
3			—2.42*	—8.25**	— 7.86**	— 8.13**	— 8.28**
4				—7.74**	— 8.18**	— 8.47**	— 8.15**
5					— 2.04*	— 1.20	.08
6						— 1.05	— 2.29*
7							— 1.38

Oklahoma's Wealth in Agriculture

Agriculture is Oklahoma's number one industry. It has more capital invested and employs more people than any other industry in the state. Farms and ranches alone represent a capital investment of four billion dollars—three billion in land and buildings, one-half billion in machinery and one-half billion in livestock.

Farm income currently amounts to more than $700,000,000 annually. The value added by manufacture of farm products adds another $130,000,000 annually.

Some 175,000 Oklahomans manage and operate its nearly 100,000 farms and ranches. Another 14,000 workers are required to keep farmers supplied with production items. Approximately 300,000 full-time employees are engaged by the firms that market and process Oklahoma farm products.

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